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ABSTRACT

This paper describes a constructivist and collaborative approach to transforming a traditional face-to-face on-campus course into an entirely Web-based course. The major objectives of this computer-supported collaborative learning (CSCL) course are for students to experience, learn and design online collaborative learning. This paper is based on the multiple experiences and perspectives of the course instructor, a course designer who also served as one of the moderators, and a student in the course. The purposes of this paper are to: (1) describe the design, implementation, and evaluation strategies used in this Web-based collaborative learning course; (2) examine the characteristics of the authentic environment designed to enable students to experience the strategies, opportunities, challenges, and benefits on online collaborative learning; (3) discusses the roles and benefits of using "e-sherpas" as a unique support system for online learning teams; (4) explore students' perspectives, reflections, and suggestions; and (5) discuss course evaluation results, lessons learned, and implications for design of online collaborative learning environments. (Author)

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The Medium is the Message – The Design of an Online Collaborative Learning Community

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Abstract

This paper describes a constructivist and collaborative approach to transforming a traditional face-to-face on-campus course into an entirely Web-based course. The major objectives of this Computer-Supported Collaborative Learning (CSCL) course are for students to experience, learn and design online collaborative learning. This paper is based on the multiple experiences and perspectives of the course instructor, a course designer who also served as one of the moderators, and a student in the course
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Introduction

Just as companies are expanding their markets globally through the Internet, so are universities increasingly offering courses globally through the Internet. There has been rapid growth in the number of courses being offered either entirely online or as a supplement to a face-to-face course (Underwood et al., 2000; McLoughlin, 2000; Mugler & Landbeck, 2000; Graham & Scarborough, 1999). Online courses span a broad spectrum of pedagogical practices from highly controlled, linear, and teacher-centered online curriculum to situated and learner-centered curriculum. Most courses are driven by the functionality and availability of tools while others are inventing new tools or new approaches to meet the specifications of a particular curriculum structure and goals.

Many online courses simply transfer face-to-face classroom lecture-based content onto online platforms without considering interactive and human factors. Instructors who transfer lecture-based face-to-face instruction models to web-based environments, often tend to create online courses with little interactivity or opportunities for students to engage in discourse, collaboratively solve problems and construct their own knowledge. Although the value of collaborative learning is recognized, many instructors are unaware of the strategies and processes for building viable virtual learning teams. Instructors and instructional designers need to understand the nature of online interactions and communications, the dynamics of group collaboration, and strategies for facilitating online interactions among diverse learners in order to design effective web-based learning activities.

The paper examined the design and implementation of a Web-based collaborative learning course that was offered at the University of Texas at Austin in fall, 2000 from the perspectives of the course instructor, a member of the instructional design team who also participated in this course as an e-sherpa (e-moderator), and a student who completed the course. The paper describes the specific design features of the course and examines the effectiveness of the e-sherpa as a support system for virtual learning teams based on feedback from the students, instructor and the e-e-sherpas. It also discusses the lessons learned and the implications for design of online collaborative learning environments.

The Course Context

A major goal of this CSCL 2000 course was to help learners understand, create, and reflect upon online collaborative learning. A variety of instructional material, resource links, and scaffolding guidelines were made available to learning teams via the WebCT courseware (Graph #1). The course content was divided into seven modules, a course handbook, a course tool page, and a resource link page (Graph #2). Each module contained tasks

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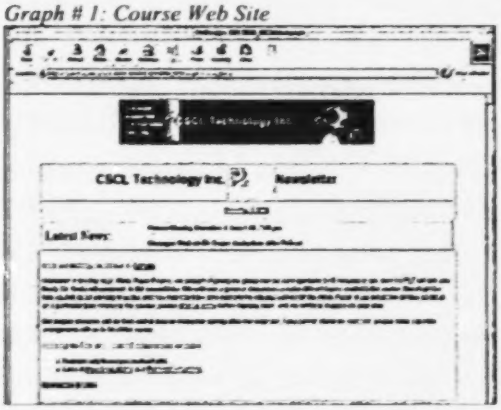
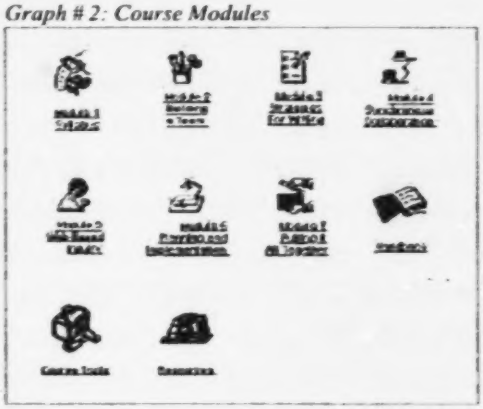
in which learners had to work both individually and collaboratively to complete learning tasks. Collaborative tasks included writing a topic paper, designing a MOO (Multi-user Object Oriented) virtual environment where users log onto a site to experience a text -based virtual reality environment, designing a WebQuest, and working collaboratively with cross-team members to develop a final project utilizing a schedule planning tool for coordination.

Module One provided an overview of the course goals, objectives, required entry skills, technology requirements, course activity schedule, and other information helpful to the students in preparing to complete the course. Module Two provided opportunities for online socialization by introducing the mission of the course, the online environment and tools, and encouraging students to socialize with peers through a class-wide introduction activity. Module Three, Four, and Five required students to exchange information and construct knowledge through online communication, collaborative inquiry, dialogue and discussion, and team building. Modules helped students understand the unique aspects of online communication and collaboration and the need for respect, honesty and mutual support. Students worked collaboratively to navigate and explore various network environments, utilizing collaborative tools to plan, schedule, negotiate, develop, make decisions, and edit finished projects as a group. The course involved developing complex collaborative documents, WebQuests as well as other intellectual products designed to engage the students in a variety of online collaborative activities with a range of collaborative technologies. In addition to the content in each module, a course handbook was developed to provide information such as a virtual office tour, an organization chart about this virtual company, a staff directory which contained information about students in the course, tips on working collaboratively, topics for collaborative work, and project examples.

Graph # 1: Course Web Site



Graph # 2: Course Modules



To accomplish course requirements, online socialization, collaboration, and communication were essential. Extensive cooperation and collaboration among learners was necessary. Web-based groupware tools offered students opportunities to exchange information, discuss tasks, upload files, work collaboratively on the same document, and socialize both asynchronously and synchronously (Graph #3). In order to provide an authentic environment, the metaphor of a high technology company, *CSCL Technology Corporation*, was employed to simulate a real world professional setting. Members of the class were divided into five virtual teams located in suites. There were two to three offices within each suite. Two to three students shared the same office and six to seven students shared the same suite (Graph #4). Diversity (ethnic background, gender, and on-campus or tele-campus access) was considered when assigning students into suites at the beginning of the semester.

Students in this CSCL course had to interact with peers, the instructor, and e-sherpas. The use of the e-sherpa is one of the key design features of this CSCL class. There was one e-sherpa in each suite of from 5-7 members. The term sherpa is used to describe a skilled Tibetan mountain climber on the southern slopes of Himalayas. The function of a sherpa on a mountain climbing expedition is to familiarize the expedition with the local terrain and to help members of the group carry their load. In this course, the e-sherpa was used to describe experienced online mentors who worked with online students in groups and helped them become self-directed and self-managed and to assist students with any challenges they encountered.

A monthly newsletter was provided at the course Web site. Students could obtain information about the regularly-scheduled Webcast (a video conference session where on-campus students can attend at the campus site and tele-campus students could attend through the Web). There were a total of five Webcast sessions in this

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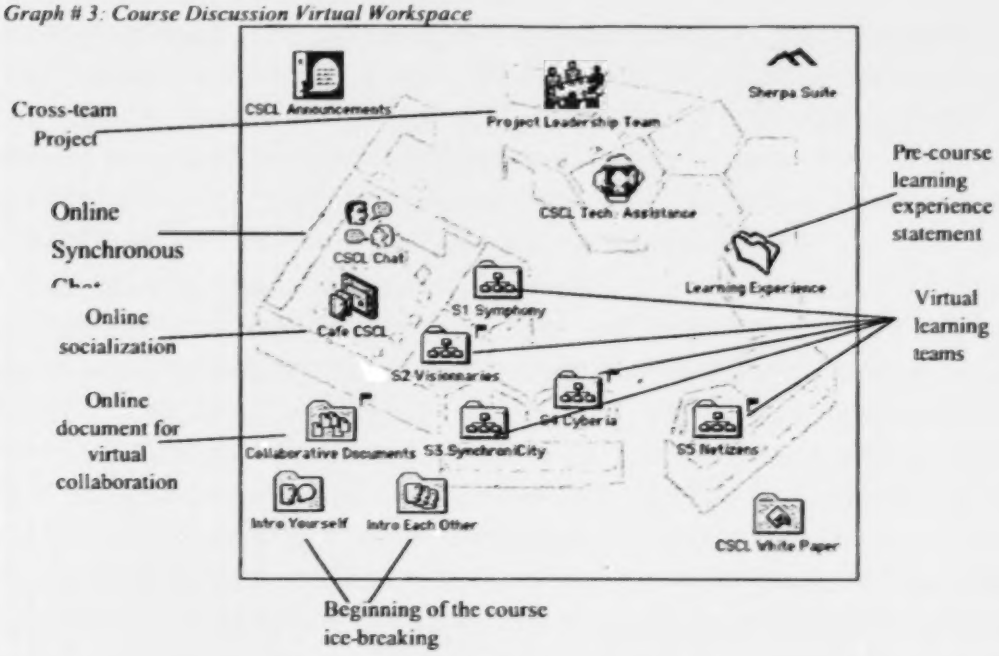
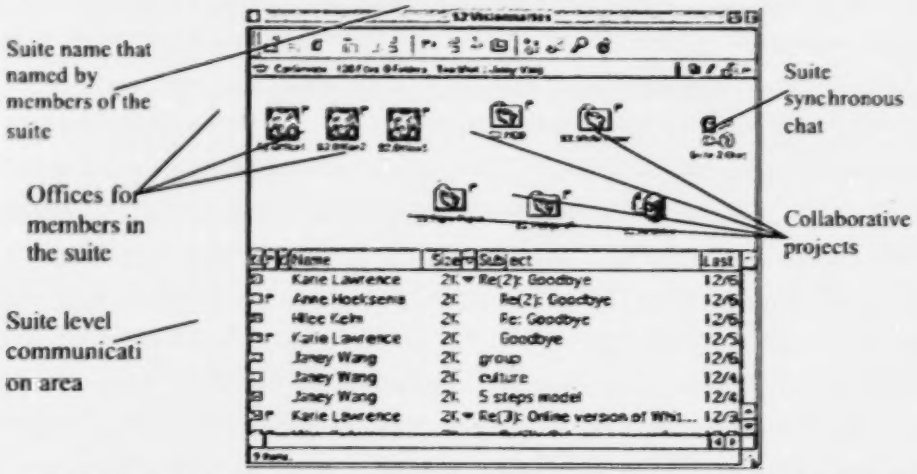
semester long course. During the Webcast, students could also participate through the dial-in phone conference from home or through the synchronous online class chat.

Graph # 3: Course Discussion Virtual Workspace



Graph # 4: Online Virtual Team - Offices and Suites



The intellectual products developed by the learning teams were based on the individual and collective contributions of members of the group. In accomplishing collaborative tasks such as creating the topic paper, navigating a MOO tour, producing a WebQuest, and writing a cross-team "White Paper." With the assistance of various tools, learners not only learned how to exploit the functionality of the tool in working collaboratively, solving problems, making decisions, and producing products. Throughout the course, learners reflected on their learning at the end of each module through personal journaling.

To assess and improve students' performance and ensure learners are held accountable to each other, evaluation rubrics were used throughout the course. Rubrics are a type of scoring guide, used to assess more authentic and complex performances and products. According to Mary Rose (1999), rubrics provide "authentic

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assessment" so the evaluations of student performance are "closer to the challenges of real life than isolated tests." Rubrics that "communicate detailed explanations ... benefit students in making them more conscious about their own learning outcomes and process," but also benefit instructors by providing them with an objective basis for assigning grades and involving students in the evaluation process.

The Medium is the Message

Two of the major challenges in Web-based courses are faculty understanding the pedagogies for engaging learners in the online learning process and the heavy demands on the instructor to monitor and manage the course. Many distance-learning courses experience high attrition rates that result from a complex of factors such as learners feeling isolated, unmotivated, overwhelmed, or unchallenged in distance learning courses. This results in the 32 percent dropout rate for online courses as compared to 4 percent for regular classroom classes (Viers, Robert).

In addition, it is easy for faculty to get overwhelmed by the amount of work it requires in developing Web-based courses. This work involves developing the initial idea of the online course and re-conceptualizing the instructional practice in order to integrate technology into curriculum. It involves extensive work in designing and developing the course content and activities, and further, to implementing and evaluating the course so students feel motivated, satisfied, and engaged. The entire evolutionary process is very costly in terms of faculty and staff time in developing the course.

Course Design: Constructivist Theory for Authentic Environment Design and e-sherpas

The philosophy behind the design of the CSCL course is Constructivism. Constructivism can be defined as a theory of learning in which knowledge is constructed in the mind of the learner. Jonassen (1994) identified the following elements of constructivist design: (1) multiple representations of reality, (2) representing the complexity of the real world, (3) emphasizing on knowledge construction instead of knowledge reproduction, (4) emphasizing authentic tasks in a meaningful context rather than abstract instruction out of context, (5) preferring real world settings to predetermined sequences of instruction, (6) encouraging thoughtful reflection on experience, (7) knowledge construction should be both content- and context-dependent, (8) knowledge construction should be through collaboration rather than competition among learners.

Reflecting Jonassen's points on constructivist theory, various design features were employed in this CSCL course. As an example, a rich learning environment with multiple forms of representations were provided to allow learners with multiple intelligences to feel comfortable in the environment and to exhibit a broader range of their talents and expertise. The provision of an authentic environment is one of the major messages this course was intended to deliver. Both cognitive and social aspects of learning were emphasized in the course. Students worked in teams throughout the semester to complete tasks. Multiple perspectives were encouraged. Authentic tasks and activities, reflecting real-world settings, built in a coherent framework allowed learners to solve problems collaboratively and develop critical thinking skills.

Constructivist classrooms are different from traditional class settings. In this environment, students work in groups while individual contributions are highly valued. Activities require students' contributions. Curricula data generated in the environment are based on dialogue and interactions among learners. The instructor, rather than a sage on the stage, seeks students' points of views and facilitates student learning. The understandings obtained from students are used as references for on-going course revisions. The learners, rather than passive knowledge absorbers, are viewed as thinkers and active learners. The assessment of student learning is usually based on students' work and progress throughout the process rather than paper-pencil tests predetermined by the instructor. The features of constructivist classrooms were deliberately built in the online CSCL curriculum.

Brooks and Brooks (1993) have identified characteristic teacher and student behaviors that are commonly found in constructivist classes: (1) encouraging student autonomy and initiative, (2) asking open-ended questions and allowing time for responses, (3) encouraging higher level thinking, (4) encouraging dialogues between the instructor and students and among students, (5) challenging students' existing knowledge and encouraging discussions, (6) encouraging the use of raw data, primary sources, and manipulative and interactive materials.

The authentic environment in this Web-based CSCL course engaged students in thoughtful and collaborative activities. There were a variety of ways team members could communicate creatively and flexibly with each other and with the instructor. As an example, students collaborated to produce projects and make decisions in pairs, in small groups, and across groups. The asynchronous nature of communication allowed learners to have opportunity for reflection and revise their answers rather than reacting immediately. The authentic activities presented learners with various problems and engaged them in various forms of collaboration and cognitive

challenges. Further, multiple perspectives among diverse learners challenged learners' existing knowledge and encouraged them to actively participate in conversations in order to achieve group success.

The CSCL class involved learners in the cognitive process in three ways: (1) The course content involved learning how to use collaborative tools, (2) The course organization involved learning how to work collaboratively with others in complex learning tasks, (3) The course location involved learning how to work at a distance, synchronously as well as asynchronously.

For better course management and learner support, the concept of the "e-sherpa," coined by the instructor, Dr. Paul Resta, was employed to function similarly to the e-moderators described by Salmon (2000). Gilly Salmon used a few case studies to describe the e-moderators' role and responsibility. As an example, Quantas College Online (QCO), an online course established in 1996 for the purpose of training all staff within Quantas Airways, expected e-moderators to welcome and encourage participants, monitor learning progress, provide feedback, facilitate learning sessions, moderate discussions, provide input, assess learning outcomes, maintain records, and update status of participants.

In this Web-based CSCL course, an e-sherpa represents a non-authoritarian support person who climbs the mountain with students to help them accomplish their goals rather than directing and leading students. The role of the e-sherpa differs significantly from the traditional authoritative leadership figure. Much like real Tibetan sherpas, the e-sherpa in this course context is neither that of serving as the leader of the team nor as the authoritarian figure of the group. Their role was to simply accompany learners and to help the online team carry the load and accomplish its learning goals. In this course, e-sherpas were a group of graduate students who had prior knowledge of the similar course structure, experience in working in online teams, good communication skills, and who were interested in the online learning environment. Some of the e-sherpas were employed at the CSCL course instructor-directed computer lab while others participated on a volunteer basis online.

The e-sherpas' roles and responsibilities included unobtrusive approach to participating and supporting learners, assisting learners when they encounter technical difficulties, clarifying assignments when necessary, providing emotional support as needed, communicating and mediating conflict within the team, helping carry the load when emergencies arise, providing positive feedback and encouragement, monitoring learning progress and sharing with the instructor and fellow sherpas.

Students' Perspectives: Issues related to course design and implementation

The design and implementation of the course required extensive monitoring, feedback and on-the-fly revision of any uncovered problems such as broken link. Course revision was an on-going process and was based on the analysis on progress in course by the instructor and instructional designers as well as understanding learners' perspectives, experiences, reflections, and suggestions. The following sections provide a summary of the feedback from students in end-of-semester course evaluations which were based on a 5-point scale measurement and issues, perspectives, experiences, and reflections discussed from the perspective of one of the authors, who was a student in the course.

General Survey Results

- I am very satisfied with the course: **3.95**
- I have learned a lot in the course: **4.29**
- I enjoyed the course: **4.05**
- The course was very stimulating for me: **4.33**
- My cooperative/ collaborative skills have improved: **4.33**
- I would like to participate in other online courses: **4.71**
- By participating in CSCL activities, I developed new perspectives on learning: **4.38**

A Students' Reflections
1. Procedural issues

The flexibility of the FirstClass groupware to provide e-mail, collaborative documents, chat, and individual and group folders made it an ideal tool for use in collaborative learning. The FirstClass collaborative environment was, however, new to most students, and the business metaphor of suites and offices was also unfamiliar and at times confusing. As part of course requirements, students were expected to locate or deposit reflections,

collaborative and individual project contributions, completed projects, introductory exercises, and work in progress documents in specific places within the virtual office. When students needed clarification to negotiate the complexities of the site, the sherpa was contacted and proved useful in clarifying these locations for the teams, especially at the beginning of the course.

In addition, the office metaphor was extended with the addition of a CSCL Announcements bulletin board icon, an icon for Tech Assistance, and a CSCL Cafe icon for informal comments unrelated to specific course concerns. The service provided by the Announcements feature was evident to all students, but the purposes of the Cafe and Tech Assistance services were sometimes misunderstood. On occasion the professor or the e-sherpa was sent questions that should have been directed to technical support, and the questions had to be forwarded to the proper technical support person. In the case of the Cafe, discussions posted there were sometimes course-specific and the class was reminded to exchange these comments in another location within their suite or office.

2. Third-party issues

The CSCL course employed several collaborative tools. As already mentioned, First Class trouble-shooting questions were sometimes misdirected to other persons instead of to the technical support folder. In the case of the other collaborative tools, in particular the various MOOs, Zebu, and the WebQuest building site, there was no clear source of technical support and students often spent more time trying to negotiate the pitfalls of the sites than they did working on some of the assignments. Some students experienced frustration and the pressure of meeting deadlines as they struggled with these sites. Of necessity, students established informal networks of assistance in which solutions to common problems were shared. A FAQ icon within the office graphic or one or more e-sherpas with special expertise would have been of great assistance here as expert resources to consult about the sites and their potential problems so students could more quickly use the resources.

3. Assignment clarification

Consistent with a constructivist philosophy the assignments were open-ended, varied, and not cumulative, and so each one had specific and unique features that the team members had to establish and clarify among themselves before and during their collaborative work. Students had to determine not only the specific content the assignment was requesting, but also the format it was to take, how it was to be organized, which parts were to be generated collectively, and which were to be generated individually and then collaboratively refined. They employed informal on-going formative evaluations as their work evolved and became more complex. There were project rubrics, which were ambiguous at times as assignment requirements were modified, as well as peer evaluation rubrics against which assessed students' contributions to the project. E-sherpas or the instructor were asked questions regarding the assignment components, and they responded with further explanations for teams or individuals.

4. Interpersonal issues

Students were placed in learning teams to assure diversity and balance in culture, knowledge of the content, and technology expertise. Occasionally, conflicts among team members arose related to differing expectations with regard to work or to interpersonal interactions. In order to successfully complete assignments, it was important for group members to take responsibility for participation in group work sessions and to meet deadlines. Sometimes work issues related to differences in quality or quantity of work arose in teams . Individuals and the group as a whole were challenged to negotiate mutually satisfactory conventions that enabled cooperation, compromise, and the giving and receiving of constructive criticism. These skills were vital for the development of quality team products and projects as well as timely completion of the project. The course design provided for the rotation of leadership roles among team members.. This allowed each team to find its own way of working best while giving each individual an opportunity for carrying greater responsibility for a while.

It was additionally important for group morale for members to be understanding, supportive, and encouraging of the work of other team members. In a few instances, individuals were unable or unwilling to serve as emotional as well as intellectual partners with their team members. In those instances, the team had greater difficulty in accomplishing its learning tasks. For the team to be successful, it had to find ways to resolve all of these issues and reach consensus. Over the entire period of the course, a general ecology of support emerged with each member contributing from his/her strength as roles emerged for leading in a variety of ways. The e-sherpas were consulted

less and less and usually asked for help only when there was an impasse. At this stage, the problems were then addressed and resolved by the instructor.

Suggestions

E-sherpas have the potential to serve several useful functions in developing and supporting online learning communities. The responsibilities, however, may require special knowledge or training in order for them to meet all of the challenges in helping virtual learning teams be successful.

1. Course assignments should be made as clear as possible, taking into consideration that in real world settings a considerable amount of ambiguity is inevitable. The e-sherpa must have a clear understanding of the course assignment components in order to clarify them to the team while avoiding offering editorial comments on the work products themselves. Obviously this responsibility requires that the e-sherpas be kept up to date on any changes to the course and its assignments that are made as the course progresses.
2. A source of practical information about the courses' collaborative tools would be an important element in the technical support network and would fill a need not met by the courseware technical support staff. Team members could avoid frustration and lost time if they could consult a FAQ or e-sherpa with the ability to facilitate their use of the collaborative tools.
3. For many students new to online collaborative learning, some direct instruction or required reading about forming collaborative teams might ease their transition from the tradition of individuals working competitively to teams working collaboratively in a constructivist classroom. An e-sherpa with skills in mediating collaborative working interactions would be useful early in the course to assist the learning team in working through the awkward period of establishing individual identities within the group ecology. Such assistance might forestall the need for more critical guidance later by establishing a well-functioning team from the start. If difficulties arose later, a working relationship with a trusted and skilled e-sherpa might make resolution of the problems easier.
4. Much of what the teams devoted themselves to might more correctly be thought of as collaborative work rather than collaborative learning although all boundaries between the two are often unclear. Through guiding conversations throughout the course, an instructor or e-sherpa could provide a way for team members to become aware of how the course is structured to facilitate collaborative learning, consider what other collaborative strategies they might try, and examine the features of effective communication within a collaborative endeavour. Difficult decisions would need to be made to prioritise existing course goals, content, and activities to build in the time and opportunity for these interactions with team members to take place.
5. Feedback in the course for team projects as well as for individual contributions and reflections was relatively sparse. One feature of constructivist theory is time for reflection on the learning process. While academic feedback is the provenance of the instructor, if the e-sherpas were deeply engaged in observing the interactions within a team, he/she would be uniquely situated to give astute feedback to the team on the nature of its collaborative interactions and to draw members into conversation about what they were learning. Using the e-sherpa merely to convey observations on the workings of the learning teams and their academic products is useful but does not capitalize on the full potential of the e-sherpa in supporting the learning of the members of the learning community.
6. At its best collaborative learning can produce a learning experience and artifacts of that experience that are greater than what an individual student could achieve working alone. The time and opportunity for risk-taking are essential for reaching this higher level of achievement. In this particular course risk-taking on the part of individuals or teams was thwarted in a number of ways. The time allowed for assignment completion did not provide a cushion for false starts or revamping common in risk-taking situations. Fewer assignments or more relaxed time requirements might alleviate this problem. Instructor feedback and its associated reassurance and encouragement are also an intangible support for risk-taking attitudes among students. The course needs a faculty presence through feedback communication with teams and with individuals more frequently and more specifically to encourage students to test their potential. Finally, the frequent peer assessment feature of the course discouraged vigorous debate or discussion that might have resulted in the group undertaking a project that contained more risk.

Team members were cautious in order not to be misunderstood and evaluated as uncooperative or unsupportive of the group.

To assure individual accountability, team members assessed their own contributions as well as those of all other team members at the end of each learning module. The positive aspect of the peer evaluations was that it helped individual team members who were late in contributing their work or participating minimally in collaborative task to become more active members of the learning team. It is also possible that the frequent peer assessments discouraged vigorous debate or discussion that might have resulted in the group undertaking a project that contained more risk. There was evidence that some team members were cautious in order not to be misunderstood and evaluated as uncooperative or unsupportive of the group.

Lesson Learned and Future Implications

Many instructors believe that online learning can have a very bright future if courses are designed well. Yet, merely transferring existing curriculum online and grouping students without regard to interpersonal dynamics will not achieve ideal student participation and collaboration. Instructors and instructional designers need to truly understand the nature of online interactions and communications, the dynamics of group collaboration, and strategies for facilitating online interactions among diverse learners in order to design activities for effective interactions.

Students and e-sherpas made various design and implementation suggestions at the end of the semester. Some of these suggestions included:

- Building trust by providing ice-breaking sessions at the beginning of the semester
- Providing e-sherpas' training prior to the semester
- Clarifying e-sherpas' roles and responsibilities prior to the semester
- Standardizing e-sherpas' monitoring process of learning teams' progress
- Standardizing e-sherpas' observation and report guidelines
- Specifying assignments and providing immediate clarifications of students' questions
- Linking design goals and implementation processes seamlessly
- Valuing the social aspects of learning equally to cognitive aspects
- Clarifying leadership roles by providing explicit guidelines
- Considering the number of tools employed carefully to avoid overwhelming students
- Avoiding holiday assignment deadlines by examining the course schedule
- Employing tasks as building blocks toward students' final projects
- Improving the immediacy of feedback for technical and instruction-related questions
- Providing frequent and constructive instructor feedback on students' learning progress
- Assisting students by conducting virtual office hours regularly
- Providing self-check quizzes in assisting learners in tracking their learning progress
- Surveying and identifying students' concerns and suggestions regularly
- Adjusting/revising course based upon identifying student concerns and suggestions

As one of the pioneers in online collaborative learning course design, we still have much to learn about the design, implementation, and evaluation to achieve optimal results in Web-based learning. The dropout rate of this CSCL course, however, was only two out of 32 students in class and the overall course evaluations were very high.. We understand that technology tools can only provide high quality in the hands of good teachers. Through the sharing of our experiences, good practices, perspectives, reflections, and suggestions, we hope to enhance online instruction in higher education.

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